

EFFECT OF COOKING ON NUTRIENT CONTENT OF BANGLADESHI VEGETABLE *SOLANUM MELONGENA*

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ABSTRACT

*Different nutrients are changed by various cooking methods. This study was performed to compare the effects of microwave heating and conventional cooking on nutrient contents of fresh Brinjal (*Solanum melongena*). The moisture content was found 92.30% and ash content was 1.40%. When the Brinjal was conventionally cooked then moisture and ash content were 93.90% and 1.30%, respectively. Therefore, microwave heated Brinjal content 92.70% and 1.40%, respectively. The fat and carbohydrate content in raw Brinjal were 2.40% and 1.89%, respectively. After conventional cooking those values were 2.40% and 1.73%, respectively and in microwave heating it showed the values were 2.10% and 1.78%, respectively. The protein and vitamin C content in raw Brinjal were 2.01% and 0.26%, respectively. After conventional cooking protein content was 1.57% and vitamin C is completely destroyed and after microwave heating it showed the values were 2.01% and 0.16%, respectively.*

KEYWORDS: Nutrient, Cooking, Vegetable, Conventional Heating, *Solanum Melongena*.

Received: Nov 30 10, 2015; **Accepted:** Jan 28, 2016; **Published:** Feb 09, 2016; **Paper Id.:** IJFSTFEB20163

INTRODUCTION

Cooking is the most important factor on food nutrients. Usually vegetables are processed at home on the basis of conventional method and taste preference rather than retention of nutrient and health-promoting compounds^[1]. It is known that cooking method affects on chemical composition, affecting the bioavailability and content of chemopreventive compounds in vegetables. Cooking methods were shown to change the contents of nutrient and health-improving compounds such as vitamin C, carotenoids, polyphenols, and glucosinolates^[2-5]. The cooking procedures such as boiling and microwaving used in these studies were based on the dietary habit in Bangladesh.

The brinjal or eggplant is a plant of the family Solanaceae (also known as the nightshades) and genus *Solanum*. It bears a fruit of the same name, commonly used in cooking. It is a delicate perennial often cultivated as an annual. Another study from Heart Institute of the University of São Paulo found no effects at all and does not recommend Brinjal as a replacement to statins.⁹⁰ Brinjal is richer in nicotine than any other edible plant, with a concentration of 100 ng/g (or 0.01 mg/100g). However, the amount of nicotine from Brinjal or any other food is negligible compared to passive smoking^[6].

Previous studies showed that Brinjal contains 92.4% moisture, 1.3% ash, 1.8% protein, 2.9% fat, 2.2% carbohydrate, 0.8% mineral, 0.028% calcium, 0.0009% iron and 0.005% vitamin C.^[7] Babu et al., (2008) stated that a from 741 Indian people commonly consumed brinjal and found nearly 10% reported allergic symptoms while 1.4% showed less symptoms than 2 hours^[8].

MATERIALS AND METHODS

Sample Preparation

Fresh vegetables Brinjal (*Solanum melongena*) was taken from Kushtia Sadar, Kushtia, Bangladesh. After collection it was washed and converted into small sizes.

Cooked by Conventional Process

From various methods of cooking, boiling method was selected for this study. For this cooking, the samples were cooked for 5 minutes in water at 100°C.

Microwave Cooking

For microwave cooking, the samples were weighed and cut into small sizes and then kept in a 250-ml beaker. Then the samples were cooked in microwave oven for 3 minutes. After that the nutrition values were determined.

Determination of Moisture Content

Moisture content was estimated by Drying Method. A crucible was taken in air oven for drying then it was taken in a desiccators for weighed (W1). Sample was accurately weighed to 2 gms and taken into the crucible and again weighed (W2). Again the sample was taken in an oven for drying and weighed (W3). Finally the moisture content was estimated as follows:

$$\% \text{Moisture Content} = \frac{(W2 - W3) \times 100}{W2 - W1}$$

Determination of Ash Content

For ash content determination, a porcelain crucible was taken in an oven for drying. Then cooled in a desiccator and weighed (W1). About 2 grams sample was taken into a porcelain crucible and again weighed (W2). It was then transferred into a furnace (550°C). To ensure proper ashing, the sample was kept in the furnace for eight hours. Then crucible was removed from furnace and cooled and finally weighed (W3). The Ash content was calculated using the following equation:

$$\% \text{Ash content} = \frac{(W3 - W1) \times 100}{W2 - W1}$$

Protein Content Determination

Kjeldahl method was used for the estimation of the protein content in samples^[9]. At first sample was dried in oven and about 2 gms was taken in a flask. Then 10-15 ml of conc. H₂SO₄ and 8 g mixture of K₂SO₄:CuSO₄ in 8:1 was added to sample. The flask was swirled for mixing well and then kept the flask in a heater for digestion. It may be taken 2 hrs to complete digestion. After cooling the preparation was taken to a volumetric flask and added distilled water to make 100ml. Markam Still Distillation Apparatus was used for distillation^[10]. 10ml of solution was taken in a distillation tube and 10 ml 0.5 N NaOH was gradually added in the tube. It was continuing for at least 10 min and produced NH₃ was preserved as NH₄OH in a conical flask which contains 20 ml of 4% boric acid solution. Then few drops of methyl red indicator was added into it. The solution was titrated with 0.1 N HCl solution. Without sample a blank titration was performed with same

way. Percent of the protein content was estimated by using the following equation:

$$\% \text{ Protein} = 6.25 \times \frac{(\text{Sample Titration} - \text{Blank Titration}) \times \text{Strength of HCl} \times 0.014 \times \text{Volume of digest Sample} \times 100}{\text{Wt. of the sample} \times \text{Volume taken for Distillation}}$$

Fat Determination

Soxhlet apparatus was used for the estimation of fat content^[11]. About 1 g of sample was passed through a filter paper and then taken in the extraction tube. Then it was weighed, cleaned and dried. Petroleum ether was taken in a beaker and start extraction. 4-6 Siphoning was performed to evaporate ether. Then the extract was transferred into a glass dish and washed with ether. After that ether was evaporated on a water bath. The dish was kept in an oven for 2 hrs at 105°C and desiccator was used for cooling. The percent of fat content was estimated by the following equation:

$$\% \text{ Fat content} = \frac{\text{Wt. of Ether Extract} \times 100}{\text{Wt. of Sample}}$$

Carbohydrate Determination

Carbohydrate was estimated by using of the moisture content, ash content, protein content and fat content with the following equation^[12].

$$\% \text{ Carbohydrate} = 100 - (\text{moisture content} + \text{ash content} + \text{protein content} + \text{fat content})\%$$

Determination of Vitamin C

Vitamin C content was determined according to the Association of Official Analytical Chemists (AOAC) Official Method 985.33 (2,6-dichloroindophenol titrimetric method)^[13]. Vitamin C content is expressed as mg/100 g fresh weight.

RESULTS AND DISCUSSIONS

Cooking as a conventional processing method has a great impact on food nutrients. Most foods are mainly consumed after being cooked and cooking considerably affects their health-promoting compounds, minerals and vitamins. In this study tried to picture the changes brought by cooking (microwave and conventional method) in the nutrient content of fresh vegetable collected from local market (Sheikpara, Jinaidah, Bangladesh) named as Brinjal (*Solanum melongena*).

This research found that fresh Brinjal contains 92.4% moisture and 93.9% for conventional cooked Brinjal whereas microwave cooked Brinjal contains 92.7% moisture (Figure 1). 1.4% ash content in fresh Brinjal but it contains 1.3% and 1.4%, respectively in conventional cooked and microwave cooked Brinjal (Figure 2).

Total crude vitamin C of raw Brinjal was 0.26%. After conventional cooking vitamin C was fully destroyed but after microwave cooking it was found 0.16% (Figure 3). On the other hand, fat content in raw Brinjal was 2.40%, but after conventional and microwave cooking it was found 2.40% and 2.10%, respectively (Figure 4).

The carbohydrate content in raw Brinjal was 1.89% and 1.73% was found in conventional cooked Brinjal, while 1.78% found in microwave cooked Brinjal (Figure 5). Total crude protein in raw Brinjal was 2.01% but after conventional and microwave cooking it was found 1.57% and 2.01%, respectively (Figure 6).

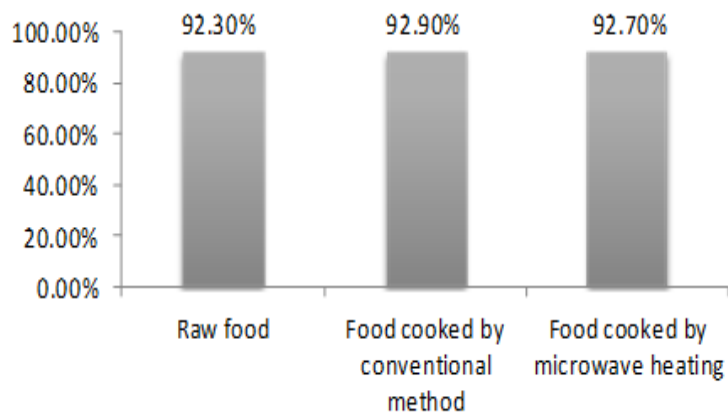
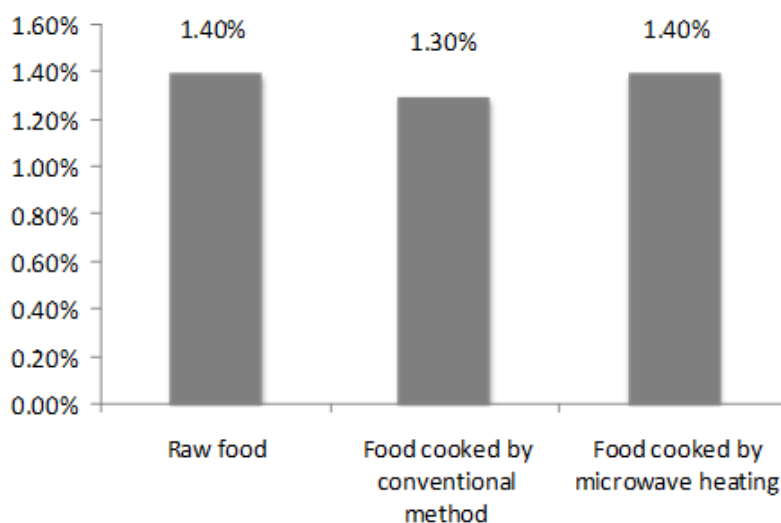
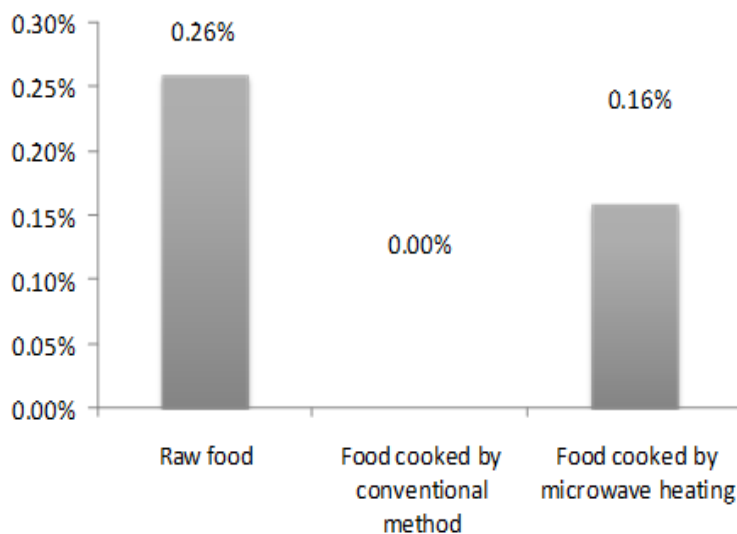
CONCLUSIONS

Peoples are suffering from nutritional values. So peoples should prefer the best method of cooking so that nutritional values are remain in good amount. From this research suggested that for cooking, microwave method is the best cooking method than other methods.

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APPENDICES

Figure 1: Change of Moisture Content in *Solanum Melongena*Figure 2: Change of Ash Content in *Solanum melongena*Figure 3: Change of Vitamin C Content in *Solanum Melongena*

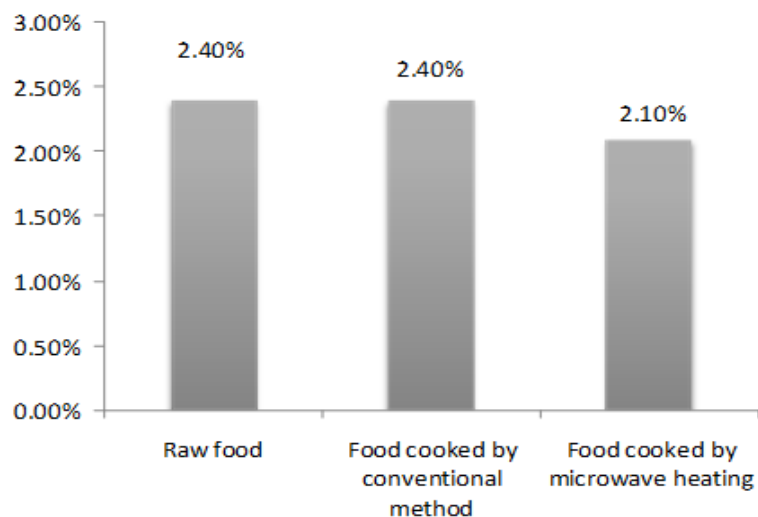


Figure 4: Change of Fat Content in *Solanum melongena*

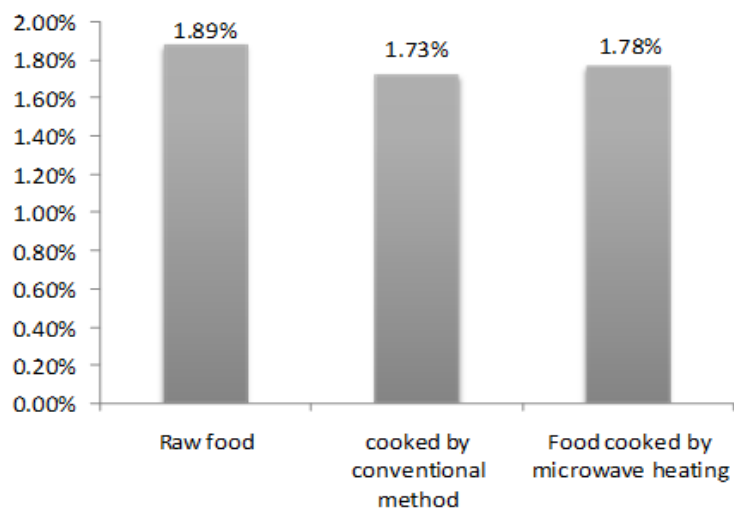


Figure 5: Change of Carbohydrate Content in *Solanum melongena*

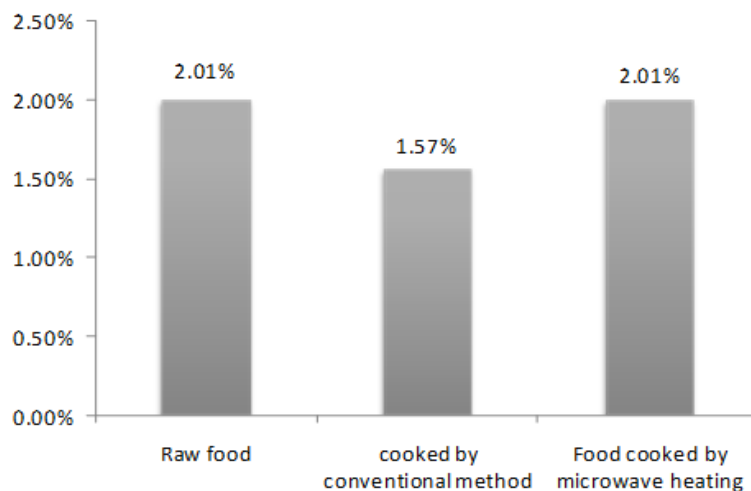


Figure 6: Change of Protein Content in *Solanum melongena*